

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-3, 9, 16, and 20-22 are presently active in this case, Claims 1, 3, and 9 having been amended by way of the present Amendment. No new matter has been entered. Claims 4-8, 10-15, 17-19, and 23-31 have been canceled without prejudice or disclaimer. Applicants reserve the right to file one or more divisional applications directed to any canceled, withdrawn, non-elected claims.

In the outstanding Official Action, Claims 1-3, 9, 16, 18, 20-22, and 26-28 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tetsuya et al. (JP 06-105680) in view of Mogi (JP 10-180228). For the reasons discussed below, Applicants request the withdrawal of the obviousness rejection.

The basic requirements for establishing a *prima facie* case of obviousness as set forth in MPEP §2143 include (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, (2) there must be a reasonable expectation of success, and (3) the reference (or references when combined) must teach or suggest all of the claim limitations. Furthermore, the proposed modification cannot change the principle of operation of a reference.

Claim 1 recites a stirred tank for storing a part of beer yeast slurry discharged from fermentation tanks where beer is fermented, and then returning the part of beer yeast slurry to

the fermentation tanks for reuse, comprising a tank body having a substantially cylindrical shape with a bottom portion having an inverted cone shape, a jacket disposed on a periphery of the tank body within which a cooling medium is circulated so as to cool the beer yeast slurry, and a stirring impeller made up of vertically oriented surfaces with no main stirring surface that is slanted from vertical, having a shape and size varied in a vertical orientation, which variation is configured to achieve vertical flow of the beer yeast slurry, and positioned within the tank body of the stirred tank, and having a lower side with a slanting surface to match the inverted cone shape of the bottom portion of the tank body, said stirring impeller being so constructed that a maximum diameter of a rotation body defined by the rotation of the stirring impeller is 60-90% of the inner diameter of the stirred tank, and the height of the rotation body is 70% or more of a depth of the part of beer yeast slurry stored in the stirred tank. Applicants submit that the Tetsuya et al. reference and the Mogi reference, either when taken singularly or in combination, fail to disclose all of the above limitations recited in Claim 1, and the record fails to provide evidence of a motivation for one of skill in the beer yeast slurry art to modify the teachings in the cited references to arrive at the claimed invention.

Claim 1 has been amended to limit the subject matter of the present invention to a stirred tank for storing a part of beer yeast slurry discharged from fermentation tanks where beer is fermented. In this respect, the Tetsuya et al. reference relates to a culture method for animal cells and a culture apparatus, and the Mogi reference relates to a garbage treatment apparatus. Thus, the present invention is more clearly distinguished from the Tetsuya et al.

reference and the Mogi reference.

In the amendment set forth herein, the feature, “a stirring impeller ... having a lower side with a slanting surface to match the inverted cone shape of the bottom portion of the tank body” has been introduced into Claim 1. Neither the Tetsuya et al. reference, nor the Mogi reference disclose or suggest such a feature, and thus for at least this reason these references fail to establish a *prima facie* case of obviousness. Furthermore, as will become clear from the discussion below, it would not have been obvious to one of ordinary skill in the art to modify the Tetsuya et al. reference and the Mogi reference to arrive at the claimed invention.

As noted above, the Tetsuya et al. reference relates to a culture apparatus for animal cells, and thus is greatly different from a stirred tank for storing beer yeast slurry of the present invention. The beer yeast slurry to be treated in the present invention is a Bingham fluid. In order to uniformly stir beer yeast slurry as a Bingham fluid without causing non-uniform distribution of the yeast concentration and temperature within the stirred tank, the important feature is that the stirring impeller is so constructed that a maximum diameter of a rotation body defined by the rotation of the stirring impeller is 60-90% of the inner diameter of the stirred tank, and the height of the rotation body is 70% or more of a depth of the part of yeast slurry stored in the stirred tank. However, this is not the case for a culture apparatus for animal cells as discussed in the Tetsuya et al. reference, where the height of a rotational body defined by the rotation of the stirring impeller is not described as being 70% or more of the liquid depth.

Thus, even if the apparatus of the Tetsuya et al. reference, in which the height of the

rotation body defined by the rotation of the stirring impeller is less than 70% of the liquid depth, is used for a stirred tank for storing beer yeast slurry such as a Bingham fluid, it would not be possible to appropriately stir the beer yeast slurry as a Bingham fluid in the upper portion of the stirred tank. As a result, non-uniform distribution of the yeast concentration and temperature may be caused within the stirred tank, which is a serious problem for a stirred tank for storing beer yeast slurry.

Also, the stirred tank for storing beer yeast slurry of the present invention is intended to store a part of beer yeast slurry discharged from fermentation tanks where beer is fermented, and then return the part of yeast slurry to the fermentation tanks for reuse. Accordingly, in order to appropriately discharge the beer yeast slurry from the stirred tank so as to return the same to the fermentation tanks, the bottom portion of the tank body has an inverted cone shape. In a bottom portion of the tank body having an inverted cone shape, it is required to appropriately stir beer yeast slurry as a Bingham fluid. Thus, the feature that the stirring impeller has a lower side with a slanting surface to match the inverted cone shape of the bottom portion of the tank body is recited in Claim 1 of the preset application.

To the contrary, the culture apparatus for animal cells of the Tetsuya et al. reference has a flat-shaped bottom portion of the tank body and a flat shaped lower side of the impeller with rounded corners. No teaching or motivation is provided therein to include the inverted cone tank body or a stirring impeller having a lower side with a slanting surface to match the inverted cone shape of the bottom portion of the tank body, as recited in amended Claim 1.

The Official Action cites the Mogi reference for the teaching of a tank having an

inverted shaped bottom portion of the tank body. However, even if the bottom shape of the garbage treatment apparatus of the Mogi reference is employed for the bottom portion of the animal cell culture apparatus of the Tetsuya et al. reference and then this is used for the stirred tank for storing beer yeast slurry of the present invention, it is not possible to appropriately stir beer yeast slurry as a Bingham fluid, since the lower side of the impeller of the Tetsuya et al. reference has a flat shape with rounded corners and the stirrers of the Mogi reference have flat lower sides. Specifically, in such a configuration, beer yeast slurry cannot be smoothly moved in proximity to the inverted cone shaped bottom portion of the tank body, so that the yeast slurry may stagnate in proximity to the inverted cone shaped bottom portion of the tank body. As a result, non-uniform distribution of the yeast concentration and temperature can be caused in proximity to the inverted cone shaped bottom portion of the tank body. Thus, the combined teachings do not arrive at the claimed invention absent substantial modification which is not warranted in view of the art and evidence of record, absent hindsight considerations.

As is evident from a review of the specification of the present application (see, e.g., discussion of Examples 3 and 4, where beer yeast slurry is discharged and returned several times), in the stirred tank for storing beer yeast slurry, the non-uniform distribution of beer yeast slurry and temperature in proximity to the inverted cone shaped bottom portion of the tank body are serious problems, which are not contemplated by the cited references that are directed to different arts.

As mentioned above, the impeller of the culture apparatus of the Tetsuya et al.

reference has a flat shaped lower side with the rounded corners that cannot appropriately stir beer yeast slurry even if an inversed cone shaped bottom portion of the garbage treatment apparatus of the Mogi reference is combined therewith. Also, even if the garbage treatment apparatus of the Mogi reference is applied without modification to the stirred tank for storing beer yeast slurry, it is not possible to appropriately stir beer yeast slurry. Specifically, the garbage treatment apparatus of the Mogi reference does not have a stirring impeller formed continuously in the vertical direction, but merely has seven stirring impellers 3 each having a small vertical height. Thus, even if these seven narrow impellers are rotated, it is not possible to appropriately stir beer yeast slurry.

In any case, by the amendment of Claim 1 introducing the feature that the lower side of the stirring impeller has a slanting surface to match the inversed cone shape of the tank body, the Applicants submit that this feature of the present invention clearly distinguishes the present invention over the Tetsuya et al. and Mogi references.

Additionally, the impeller blade is made up of vertically oriented surfaces with no main stirring surface, and has a shape and a size varied in a vertical orientation, which variation is configured to achieve vertical convection of the yeast slurry. The impeller of the culture apparatus of the Tetsuya et al. reference is slanted at an angle of 0° to 15° and preferably 5° to 15° relative to the rotational shaft so as to facilitate the vertical flowing of cell culture medium, as described in the paragraph [0020] of the specification. That is, in the Tetsuya et al. reference, the vertical convection of liquid is achieved by slanting the impeller. On the contrary, in the present invention, the vertical movement of yeast slurry is achieved by

varying the shape and size of the stirring impeller in the vertical orientation, while the stirring impeller is made up of vertically oriented surfaces with no main stirring surface.

In the stirred tank for storing beer yeast slurry, beer yeast slurry is attached to the stirring impeller and remains. Therefore, it is necessary to wash this by shower washing or the like. In this respect, when the impeller is slanted, the remaining yeast may not be satisfactorily washed, and therefore the stirring impeller is required to be made up of vertically oriented surfaces with no main stirring surface. Thus, the present invention is also distinguishable from the Tetsuya et al. reference on this point.

Accordingly, Applicants submit that a *prima facie* case of obviousness cannot be established with respect to Claim 1 based on the combined teachings of the Tetsuya et al. reference and the Mogi reference. Thus, the Applicants respectfully request the withdrawal of the obviousness rejection of Claim 1.

The claims that depend from Claim 1 are considered allowable for the reasons advanced for the independent claim from which they depend. These claims are further considered allowable as they recite other features of the invention that are neither disclosed nor suggested by the applied references when those features are considered within the context of Claim 1.

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Consequently, in view of the above discussion, it is respectfully submitted that the present application is in condition for formal allowance and an early and favorable reconsideration of this application is therefore requested.

Respectfully Submitted,

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